M2 Internship Proposal

Laboratory 1: Molecular Systems and Nanomaterials for Energy and Health (SyMMES UMR5819 CEA-CNRS-UGA)
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Laboratory 2: Le laboratoire de PHotonique ELectronique et Ingénierie QuantiqueS (PHELIQS)
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Internship proposal

Improvement of biosensor sensitivity by using nanoparticles for biomedical applications

Today, there is an increasing demand for reliable and robust novel health technology for the analysis of disease biomarkers, proteins, amino acids, nucleic acids, metabolites, etc. Biosensors have emerged as a highly dynamic measurement platform for qualitative and quantitative analysis of these analytes. Indeed, they have proven their reactivity and importance in recent COVID pandemic by providing economical and industrial detection solutions in only few weeks for billions of COVID tests. Nevertheless, the main challenge in biosensor development lies in the continuous demand for high sensitivity. With the advancement of nanotechnology, the use of various nanomaterials in biosensor development allows for the signal amplification for higher sensitivity.

The laboratory SyMMES has rich experience in the development of biosensors based on surface plasmon resonance imaging (SPRi) for biomedical applications. In this internship, we propose to explore different strategies to amplify optical signal of biosensors based on SPRi by using different types of nanoparticles (metal nanoparticles, quantum dots, etc.). During the internship, different techniques concerning the conception and construction of biosensors and biochips, surface functionalization (self-assembled monolayers, SAMs) and characterization, as well as sensing system based on SPRi will be used. The internship will be carried out in a multidisciplinary environment, within two laboratories, at the interface of nanophysics, chemistry, biology and nanotechnology.

Background of candidates:
Biotechnology, nanotechnology, or physical-chemistry with strong interest on the biology and nanotechnology.
Internship period: 5 or 6 months in the period of January to September 2022